## A NEW SPECIES OF SEA-MOUSE (APHRODITA HASTATA) FROM EASTERN MASSACHUSETTS.

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The common European sea-mouse (*Aphrodita aculeata*) has been so frequently and so widely reported from the American Atlantic coast, while none of the writers on our annelids have reported any other species, that the identity of the species occurring on the two sides of the Atlantic has been taken as established. It was, therefore, with genuine surprise that I found, while preparing a description from Wood's Hole specimens for a report on the annelids of that region, certain obvious points of difference between these and *A. aculeata* as described by European writers. Since returning to Philadelphia a more thorough examination of the literature and a detailed comparison of specimens in the collection of this Academy with those belonging to the U. S. F. C. laboratory at Wood's Hole, kindly sent to me by Mr. Vinal Edwards, and two specimens of *A. aculeata* from the neighborhood of Helgoland, for the opportunity of studying which I am indebted to Dr. W. McM. Woodworth, of the Museum of Comparative Zoology, have doubly convinced me of the wide distinction between the species common in the deeper waters of the open sea off the Wood's Hole region and the European species. This does not, of course, exclude the possibility of the occurrence of the true *A. aculeata* also on our coast, yet the few notes furnished by Prof. Verrill in his *Report on the Invertebrates of Vineyard Sound* lead to the belief that the species therein recorded as *A. aculeata* is the one herein described, which it seems probable is the only one occurring south of Cape Cod.[1]

*A. hastata* is really less closely related to *A. aculeata* than to other species of the genus and probably finds its nearest ally in *A. japonica* Maren., which is widely distributed in the northern Pacific. From that species it differs in having the notopodial setæ free from the felt and in the decidedly smaller number of neuropodial setæ, which also lack the terminal pilosity in all of those examined.

[1] Mr. James E. Benedict writes me that Prof. Verrill has informed him that two species of *Aphrodita* are found on our coasts. Owing to the illness of Miss Bush, to whom their discrimination is said to be due, I have been unable to secure further information.

From *A. aculeata* it departs in many and striking characters. Perhaps the most important is the altogether different form of the large notopodial spines. In the former they are acute, rigid needles whose points project stiffly a short distance above the felt, and are capable of inflicting quite painful wounds. In the latter they curve over the back to or beyond the middle line and are soft, flexible but friable, and terminate in acute and hooked tips. It is interesting to note that McIntosh states that the young of *A. aculeata* possess setæ of this sort, which are later replaced by the acute spines. But *A. hastata* and several other species retain the more primitive form throughout life, unless, of course, as frequently happens, they are accidentally injured. In *A. aculeata* the number of neuropodial setæ is constantly greater in the middle and ventral rows and sometimes greater in the dorsal row, and they are stouter, less acute and differ otherwise in form. The lateral fringe of hairs is brilliant green in *A. aculeata*, pearl color or reddish in *A. hastata*, and there are other minor differences. A dissection of a single example of *A. hastata* indicates identity in the internal anatomy of the two species. The complete description follows:

**Aphrodita hastata** sp. nov.

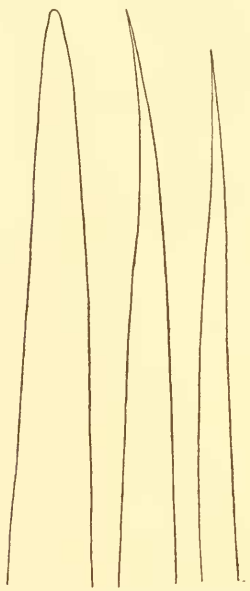
The size is large, examples of 125 mm. long and 40 mm. in maximum breadth at somite XII, exclusive of the setæ, being common, though none equalling the maximum size of *A. aculeata* has been seen. Examples of 70 to 125 mm. have 40 or 41 somites, the last 15 or so being very small and comprising not more than one-eighth of the total length.

As in *A. aculeata*, the form is robust and strongly arched in the anterior half, the last fourth becoming slender and tapering rapidly in both planes. The ventral surface is relatively smooth and pale, the brownish spherical papillæ being few in number but increasing toward the sides and becoming numerous on the dorsal, anterior and posterior surfaces of the parapodia. Hidden, of course, beneath the dorsal felt are 15 pairs of elytra and the dorsal fimbriated organs, both arranged as in *A. aculeata*.

The prostomium is orbicular obovate; the greatest width, which lies near the anterior border, is about equal to the length and the posterior half tapers rapidly to a width of about one-third the maximum. The two minute, closely approximated eyes on each side are placed just anterior to the greatest breadth of the prostomium and separated by a wide median interspace. Although apparently quite variable the facial tubercle is nearly always considerably shorter than the prostomium, strongly compressed below, broad and usually with a median groove above. While the usual spherical papillæ stud its surface it is otherwise

smooth and exhibits little of the nodular character seen in some species. The median tentacle has a total length slightly exceeding the prostomium, of which about one-fourth or more constitutes the strongly clavate basal piece. The style is slender and regularly tapering, and in no case exhibits any trace of the club-shaped extremity figured by McIntosh for *A. aculeata*. The palpi are from six to eight times as long as the prostomium and nearly twice as long as the first parapodium and tentacular cirri; in form they are slender and regularly tapering.

Nothing peculiar appears in the form or modifications of the parapodia, which resemble those of *A. aculeata*, though the first pair appear to be rather longer, their tips reaching about 1½ times the length of the prostomium beyond the latter. The ventral cirri reach to the middle row of neuropodial setæ, while the dorsal cirri extend fully one-third of their length beyond the tips of the longest of the latter, being therefore relatively somewhat longer than in *A. aculeata*.



Figs. 1, 2 and 3.—Neuropodial setæ from somite X. Anterior of dorsal, posterior of middle, and middle of ventral series, respectively. All × 56.

The general arrangement of the several forms of setæ is that usual in the genus. Of the three series of neuropodials the dorsal invariably contains two, the middle usually 4, and the ventral 8, though 5 may occasionally occur in the middle and 7 to 8 in the ventral series. All of these setæ are brown and decidedly iridescent, and the slender ones quite pale. In the dorsal row both spines (fig. 1) are very stout, and both terminate in blunt points which probably result from wear, though not a single one of these spines in any of my specimens presented a really acute tip. The middle setæ (fig. 2) are moderately and the ventral (fig. 3) decidedly slender, and both are similarly formed, with acute attenuated tips not preceded by any enlargement and not concealed in a pilose coat, though those newly extruded are sheathed. In the dorsal series the anterior seta is frequently stouter, while those in the other two increase in size from before backward. Toward the caudal end, coincidentally with the reduction in size of the parapodia, these setæ become more slender, smaller and fewer, and on the last 7 or 8 parapodia are altogether wanting.

From the lower side of the notopodial tubercle arises a tuft of iridescent hairs which spring from a curved line reaching from the anterior margin of the tubercle upward and backward to the base of the notopodial cirrus, which occupies a posterior position. These capillary setæ spread in a flowing plume outward, backward and upward, covering the sides of the body and the neuropodia. Compared with the corresponding structures in *A. aculeata* they present numerous differences. In the first place they are fewer, about one-third longer and spread more widely, irregularly and in greater disorder from the sides. In our species they are much softer and less harsh and rigid—a difference which becomes especially evident if they are brushed forward and released, when those of *A. aculeata* spring quickly back to position, while those of *A. hastata* return slowy and gently. But the most striking difference is in color, ours being far less brilliant than the European species. When placed in corresponding positions with reference to the light and the observer's eye, namely, with the caudal end toward the light and the head toward and below the observer, the marginal hairs of *A. aculeata* appear of a beautiful burnished golden green color, rich golden predominating toward the base and a fine viridian green in the outer half, the intensity of the display being enhanced by the great number and relatively compact arrangement of the hairs, while the general effect of those of *A. hastata* varies from a pearl color to a richer bronzy red in different individuals. In the paler variety the hairs appear purplish-blue, toward the base changing to a delicate red, and toward the tip to a varied mixture of reddish-purple and bluish-green which differs as the glancing light strikes particular hairs at different angles. Owing to the more open, spreading arrangement of the hairs in our species this dispersal of the colors is more evident. When viewed at other angles or by transmitted light the distribution of colors differs.

Fig. 4.—Tip of notopodial seta. × 250.

The two tufts of large notopodial spines arise, as in most species, one just anterior to the dorsal cirrus, the other, separated by a short interval, higher on the dorsum. The first consists of about 4 and the second of about 6 or 7 long, curved, soft, coarse and brownish setæ which, after perforating the dorsal felt, curve, most of them perfectly free from and above the latter, caudad and

mediad, often crossing those of the opposite side and many of them attaining a length in excess of the greatest width of the body. At the base they are very coarse, but taper gradually to the tip, which is recurved as an acutely pointed hook (fig. 4). In section they are often flattened and seldom perfectly circular. The interior consists of a core of soft colorless fibres which are enclosed in a firmer and brittle sheath or shell of a more or less iridescent brown color. It is to this structure that these spines owe their softness and fragileness, the latter quality being so marked that large specimens almost invariably have all of them broken short off above the felt, leaving the latter exposed over the entire median expanse of the back, and giving to this species an aspect which has naturally led to its identification with *A. aculeata*.

The felt fibres arise in three tufts, one ventral, one between and one dorsal to the dorsal setæ bundles. In large specimens the felt forms a uniform continuous layer nearly $\frac{1}{8}$ in. thick and of a smooth, compact texture. The fibres appear to be finer than in the two specimens of *A. aculeata* available for comparison. They also have less color, many of them being altogether dull and colorless while others exhibit a slight greenish iridescence.

The type is No. 20, Collection Acad. Nat. Sci., and was taken by Dr. Benjamin Sharp on the beach at Nantucket after a storm. About a dozen other specimens have been examined, coming partly from the same place, partly from the collections of Mr. Vinal Edwards on Noman's Land and from dredgings of the U. S. F. C. steamer *Fish Hawk* in the deeper waters off the same region. The species has not been taken in the course of the recent extensive dredgings of the *Fish Hawk* and *Phalarope*, either in Vineyard Sound, Nantucket Sound, or Buzzard's Bay. Occasionally, it is brought up in lobster pots set in the deeper waters off Noman's Land, and it is probably this species which is said to be sometimes thrown up in great numbers during heavy storms on the shores of Block Island.